

## Three new species of the crangonid genus *Metacrangon* Zarenkov (Crustacea: Decapoda: Caridea) from Australia

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### Abstract

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Examination of collections from waters off southern Australia resulted in significant findings of three new species of the crangonid genus *Metacrangon* Zarenkov, 1965: *M. australis* sp. nov. from the Southern Ocean off Tasmania, west of Macquarie Island; *M. poorei* sp. nov. from the Tasman Sea; and *M. spinidorsalis* sp. nov. from waters off southwestern Western Australia and the Tasman Sea. The two former species are morphologically similar to *M. variabilis* (Rathbun, 1902) from the north Pacific and *M. proxima* Kim, 2005 from Japan. The third is referred to the informal *M. jacqueti* (A. Milne-Edwards, 1881) species group. Differentiating characters of these three new species are discussed and a key to their identification is provided.

### Keywords

Crustacea, Decapoda, Caridea, Crangonidae, *Metacrangon*, new species, key, Australia, Victoria, Western Australia, Tasmania, Macquarie Island

### Introduction

The crangonid shrimp genus *Metacrangon* Zarenkov, 1965 is rather diverse, with 26 named species and one subspecies (De Grave *et al.*, 2009; Komai and Komatsu, 2009; Komai, in press). It is characterised by the shallowly depressed gastric region of the carapace, the usual presence of a pair of submedian teeth on the carapace, the laterally flared pleuron of the sixth abdominal somite, and the second pleopod with an appendix masculina being much shorter than the endopod (Zarenkov, 1965; Butler, 1980; Kim and Hayashi, 2003; Kim, 2005). Christoffersen (1988) supported the monophyly of the genus. Many of these 27 taxa are rare, reported from limited geographic locations that are often confined to or near their type localities. Although species of *Metacrangon* are well represented in the north Pacific Ocean, no species of the genus have been described from Australia. Poore (2004) reported that unidentified species were known to occur on the southeastern shelf off eastern Tasmania at around 500–600 m depth, but to date, these have remained undescribed. A nominal new species from southwestern Australia was also recently reported by Poore *et al.* (2008) from sampling cruises off the continental margin of Western Australia onboard the FRV *Southern Surveyor* in 2005, mounted by CSIRO Marine and Atmospheric Research (CMAR) and Museum Victoria (project entitled ‘Mapping benthic ecosystems on the deep

continental shelf and slope in Australia’s southwest region’).

This present study was initiated to describe the new species from southwestern Australia reported by Poore *et al.* (2008), but our examination of the *Metacrangon* specimens lodged in Museum Victoria, referred to by Poore (2004), confirmed two further species, both new to science. In this paper, these three new species are described and illustrated: *M. australis* sp. nov. from waters southeast of Tasmania off Macquarie Island; *M. spinidorsalis* sp. nov. (= *Metacrangon* sp. Poore, 2004 and *Metacrangon* sp. MoV 5423 Poore *et al.*, 2008) from southwestern Australia and the Tasman Sea; and *M. poorei* sp. nov. from the Tasman Sea. These three species occur in rather high latitudinal areas.

The examined material remains in Museum Victoria, Melbourne (MV) and the Western Australian Museum, Perth (WAM). The abbreviation ‘sp. MoV’ refers to the unique Museum Victoria number allocated to new or undetermined taxa (and is not the same as sp. nov., which refers to a new species). The measurement provided is of the postorbital carapace length (cl) measured from the level of the posterior margin of the orbit to the midpoint of the posterodorsal margin. In order to avoid unnecessary repetition, only *M. spinidorsalis* is fully described and differential descriptions are given for the other two new species.

### Taxonomic account

#### *Metacrangon australis* sp. nov.

Figures 1–3

**Material examined.** Holotype: Australia, Tasmania, southwestern Pacific west of Macquarie Island (54°42.42'S, 158°45.12'E – 54°41.36'S, 158°43.12'E), 700–900 m, 22–23 Jan 1999, FRV *Southern Surveyor*, epibenthic sled (stn SS01/99/65), NMV J60424 (1 female, cl 13.1 mm).

Paratypes: same data as holotype, NMV J61200 (2 females, cl 9.9, 12.1 mm).

**Description.** Body (fig. 1) moderately robust. Rostrum (figs 2a–b) narrowly triangular with acute apex in dorsal view, directed forward or slightly ascending, about 0.20 times as long as carapace; dorsal surface with middorsal carina in proximal half; lateral margin slightly convex in lateral view, merging into orbital margin; midventral carina distinct, ventral margin nearly straight in lateral view. Carapace (figs 1, 2a) very slightly widened anteriorly, longer than wide postorbitally; surface covered with very short setae; dorsal midline with two moderately small, subequal teeth; anterior (epigastric) tooth arising at 0.10 of carapace length, posterior (cardiac) tooth broken off, arising at 0.75–0.80 of carapace length; submedian and hepatic teeth moderately small; antennal tooth moderately strong, directed forward in dorsal view, weakly ascending (same degree as rostrum) in lateral view, acuminate, falling short of rostral tip; orbital cleft absent; anterolateral margin between antennal and branchiostegal teeth sinuous with obtuse lobule (holotype) or with tiny denticle (paratypes) inferior to base of antennal tooth; branchiostegal tooth moderately strong, very slightly diverging anteriorly in dorsal view and strongly ascending in lateral view, distinctly overreaching dorsodistal margin of antennal basiscerite; pterygostomial tooth small, visible in lateral view; postorbital carina clearly delimited, accompanied by longitudinal suture; weak epibranchial carina present.

Thoracic sternites depressed; fifth sternite with small, forwardly directed median tooth, otherwise unarmed.

Abdomen (figs 1, 2c) moderately sculptured; first to fifth somites with sharply delimited, crested middorsal carina, anterior end of middorsal carina on second somite produced anteriorly. Pleuron of anterior four somites rounded marginally. Fifth somite with posterodorsal margin slightly produced medially; posterolateral margin unarmed; pleuron with posteroventral angle rounded, ventral margin gently convex. Sixth somite 1.6 times longer than wide, with distinct, slightly curved submedian carinae, not reaching posterodorsal margin; dorsolateral carina distinct, reaching to posterodorsal margin; posterodorsal margin produced, distinctly bilobed; pleuron flared laterally, with small posteroventral tooth; posterolateral process moderately strong, directed posteriorly, terminating in sharp tooth. Telson (figs 2c–d) tapering distally to acute apex, with three pairs of minute dorsolateral spines, anteriormost pair located at posterior 0.35; three pairs of spiniform setae posterior to third pair of dorsolateral spines.

Eye (figs 2a–b) as long as wide; cornea as wide as eyestalk, darkly pigmented, corneal width 0.13–0.15 of carapace length; eyestalk with small, papilla-like dorsal tubercle.

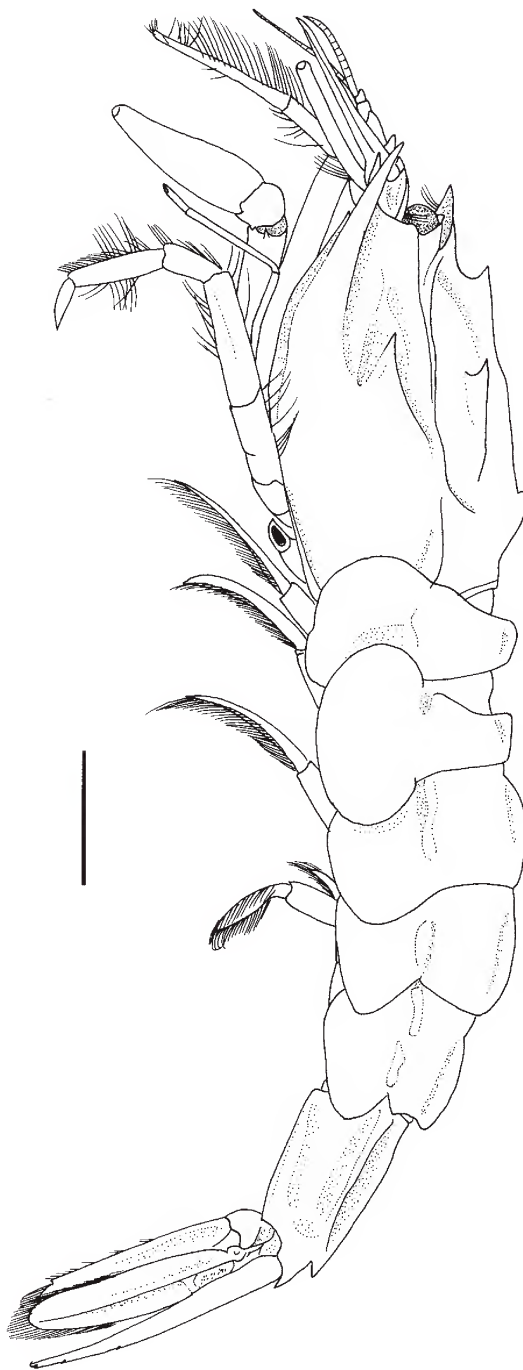


Figure 1. *Metacrangon australis* sp. nov., holotype, female (cl 13.1 mm), NMV J60424, entire animal in lateral view (left fifth pereopod lost). Scale bar = 5 mm.

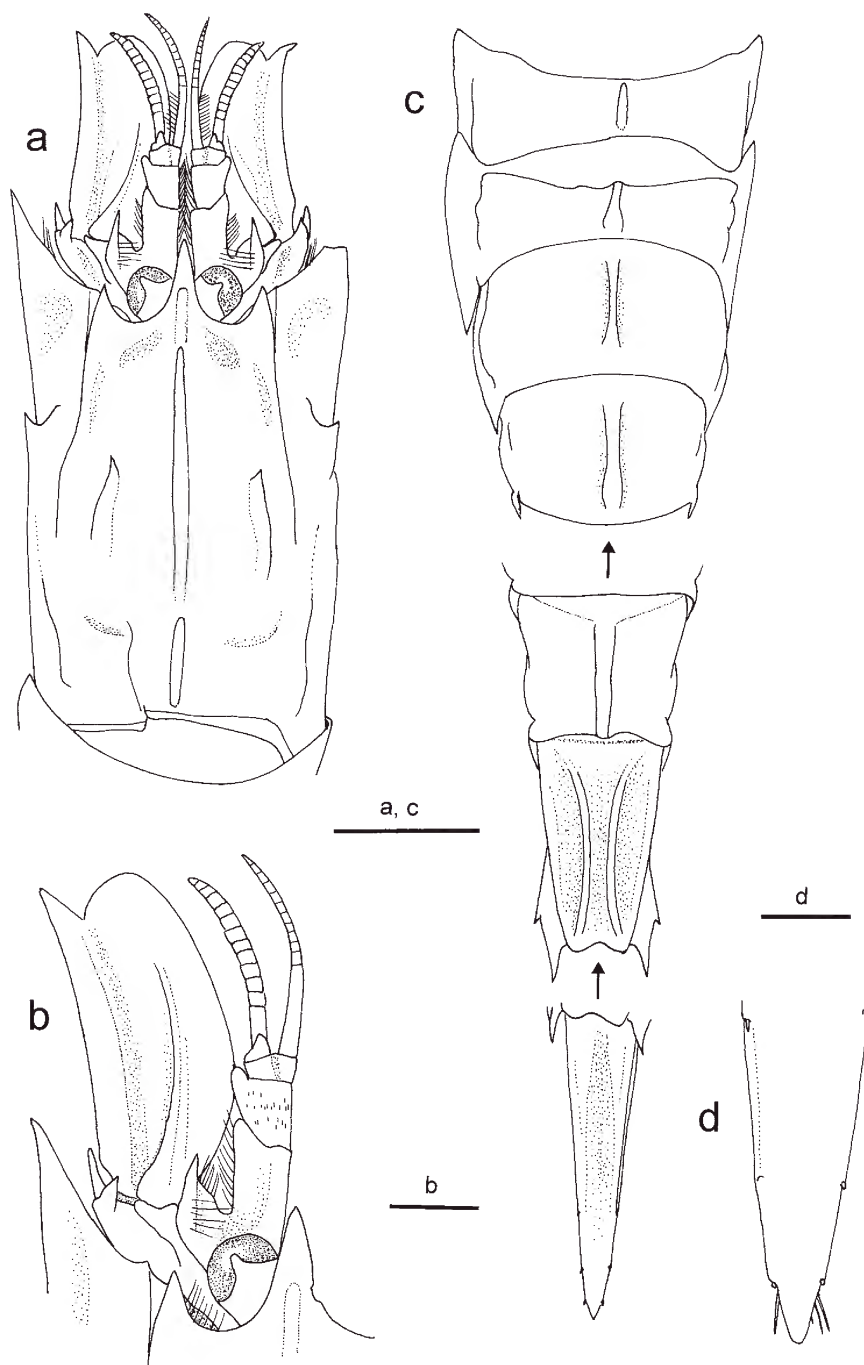


Figure 2. *Metacrangon australis* sp. nov., holotype, female (cl 13.1 mm), NMV J60424: a, carapace and cephalic appendages, dorsal view (setae partially omitted); b, anterior part of carapace (left side) and left cephalic appendages, dorsal view; c, abdomen, dorsal view; d, posterior part of telson, dorsal view. Scale bars = 5 mm for a and c; 2 mm for b; 1 mm for d.

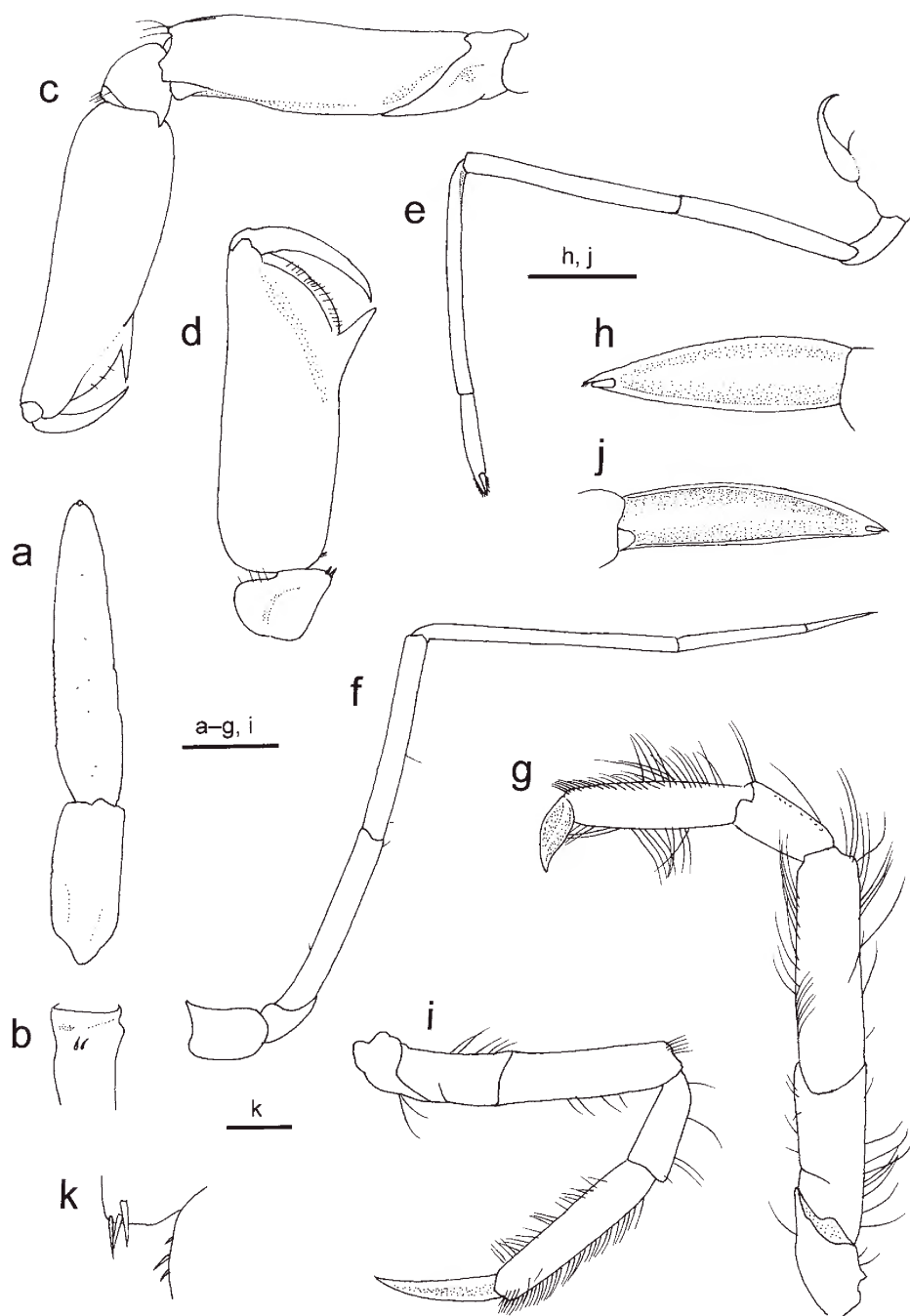


Figure 3. *Metacrangon australis* sp. nov., holotype, female (cl 13.1 mm), NMV J60424: a, distal two segments of left third maxilliped, dorsal (extensor) view (setae omitted); b, distal part of antepenultimate segment of left third maxilliped, ventral view; c, left first pereopod, lateral view; d, same, subchela and carpus, dorsal (extensor) view; e, left second pereopod, lateral view; f, right third pereopod, lateral view; g, left fourth pereopod, lateral view; h, same, dactylus, flexor view; j, same, dactylus, flexor view; i, right fifth pereopod, lateral view; k, posterolateral tooth of left uropodal exopod, dorsal view (setae omitted). Scale bars = 2 mm for a–g and i; 1 mm for h and j; 0.5 mm for k.

Antennular peduncle (figs 2a–b) moderately stout, reaching midlength of antennal scale. First segment with prominent, blunt distolateral process directed dorsally; distomesial margin unarmed; stylocerite falling far short of distolateral process of first segment, terminating in slender, sharp tooth, lateral margin gently convex. Second segment widened distally, slightly longer than wide, with prominent, blunt distolateral process. Third segment much wider than long. Outer flagellum consisting of 13 articles.

Antennal basicerite (figs 2a–b) stout, with acutely pointed dorsodistal lateral angle and long ventrolateral tooth distinctly overreaching dorsodistal lateral angle. Antennal scale (figs 2a–b) 0.50–0.55 times as long as carapace and about 2.3 times longer than wide; lateral margin weakly concave; distolateral tooth moderately broad, slightly overreaching rounded lamella.

Third maxilliped (fig. 3a) relatively stout, overreaching antennal scale by full length of ultimate segment; ultimate segment about 4.5 times longer than wide; penultimate segment about 2.3 times longer than wide; antepenultimate segment with two subequal spiniform setae subdistally (fig. 3b).

First pereopod (fig. 3c) moderately stout, slightly overreaching antennal scale; palm (fig. 3d) 2.9 times longer than wide, not widened proximally or distally; lateral and mesial margins faintly sinuous; thumb relatively long; carpus with small ventrolateral tooth, otherwise unarmed on distolateral margin; merus with small dorsodistal tooth, ventral margin sinuous, crested. Second pereopod with dactylus about 0.3 times as long as palm (fig. 3e); length ratio of chela to ischium 1:2.3:2.2:1.8. Third pereopod (fig. 3f) slender; length ratio of dactylus to ischium 1:1.8:3.8:2.8:2.8. Fourth pereopod (fig. 3g) relatively stout, reaching nearly distal margin of antennal scale; dactylus (fig. 3h) elongate subovate, spatulate, about 0.5 times as long as propodus, margins naked; dactylus–propodus articulation about 60°; propodus about 4.0 times longer than wide; propodus–carpus combined distinctly shorter than merus–ischium combined. Fifth pereopod (fig. 3i) shorter than fourth pereopod; dactylus (fig. 3j) spatulate, subequal in length to dactylus of fourth pereopod, about 0.7 times as long as propodus.

Uropodal exopod with blunt posterolateral tooth and with three spiniform setae (fig. 3k).

**Colouration.** Not known.

**Distribution.** Known only from the type locality in the Southern Ocean southeast of Tasmania, west of Macquarie Island, at depths of 700–900 m.

**Remarks.** *Metacrangon australis* is somewhat similar to *M. proxima*, *M. variabilis* and *M. poorei* sp. nov. in the general disposition of carapacial teeth and the carination of the abdomen, but it is quite unique within the genus in having the combination of the following characters: the rostrum is narrowly triangular and distinctly overreaches the distal corneal margins; the carapace has two middorsal teeth, of them the anterior tooth is distinctly postrostral and the posterior (cardiac) tooth arises at 0.75–0.80 of the carapace length; the lateral margin of the rostrum merges into the orbital margin, thus no cleft is defined; the first to fifth abdominal somites bear

sharp, crested middorsal carina; and the anterior three pleura are rounded marginally. Of particular note is the lack of an orbital cleft, an uncommon trait previously known only in *M. knoxi* (Yaldwyn, 1960) (see Komai, 1997). *M. knoxi* is referred to the *M. jacqueti* (A. Milne-Edwards, 1881) species group (Komai, 1997) and is readily distinguished from *M. australis* by the anterior middorsal tooth on the carapace that arises at the midlength of the rostrum and the presence of a ventral tooth on each first to third abdominal pleuron.

**Etymology.** Named '*australis*', Latin meaning 'southern', alluding to the type locality of this new species, representing the southernmost locality of the genus.

### *Metacrangon poorei* sp. nov.

Figures 4, 5

**Material examined.** Holotype: Australia, off southeastern Victoria, (39°53.76'S, 149°03.39'E), 1608 m, 28 Apr 2000, FRV *Southern Surveyor*, epibenthic sled, (stn SS01/00/246), NMV J52069 (1 female, cl 8.1 mm).

**Description.** Based on holotype female. Body (figs 4a–e) moderately robust. Rostrum (figs 4a–b, 5a) triangular with acute apex in dorsal view, strongly ascending (angle against horizontal plane of carapace about 45°), 0.20 times as long as carapace; dorsal surface with low, but clearly delimited middorsal carina; lateral margin faintly sinuous in lateral view, merging into postorbital region of carapace; midventral carina distinct, ventral margin sinuous in lateral view. Carapace (figs 4a–b) not widened posteriorly, longer than wide postorbitally; dorsal midline with two moderately small teeth; anterior (epigastric) tooth arising at 0.18 of carapace length, posterior (cardiac) tooth broken off, arising at 0.68 of carapace length; submedian and hepatic teeth moderately small; antennal tooth moderately strong, directed forward in dorsal view, strongly ascending (same degree as rostrum) in lateral view, acuminate, falling slightly short of rostral apex; orbital cleft distinct; anterolateral margin between antennal and branchiostegal teeth concave, unarmed; branchiostegal tooth moderately strong, directed forward in dorsal view, strongly ascending in lateral view, reaching dorsodistal margin of antennal basicerite; pterygostomial tooth small, clearly visible in lateral view; postorbital carina clearly delimited, accompanied by longitudinal suture; epibranchial carina weakly absent.

Fifth to eighth thoracic sternites each with distinct median keel: on fifth, spiniform, directed forward; on sixth, terminating anteriorly in tiny tooth; on seventh, angulated anteriorly; and on eighth, rounded.

Abdomen (figs 4c–e) slightly sculptured, surface sparsely punctate; first somite with trace of middorsal carina, second to fourth somites with rather broad, clearly delimited middorsal carina. Pleuron of anterior four somites rounded marginally. Fifth somite with low, rather broad, clearly delimited middorsal carina; posterodorsal margin faintly produced medially; posterolateral margin unarmed; pleuron with posteroventral angle rounded, ventral margin gently convex. Sixth somite 1.7 times longer than wide, with distinct, slightly curved submedian carinae, not reaching posterodorsal margin;



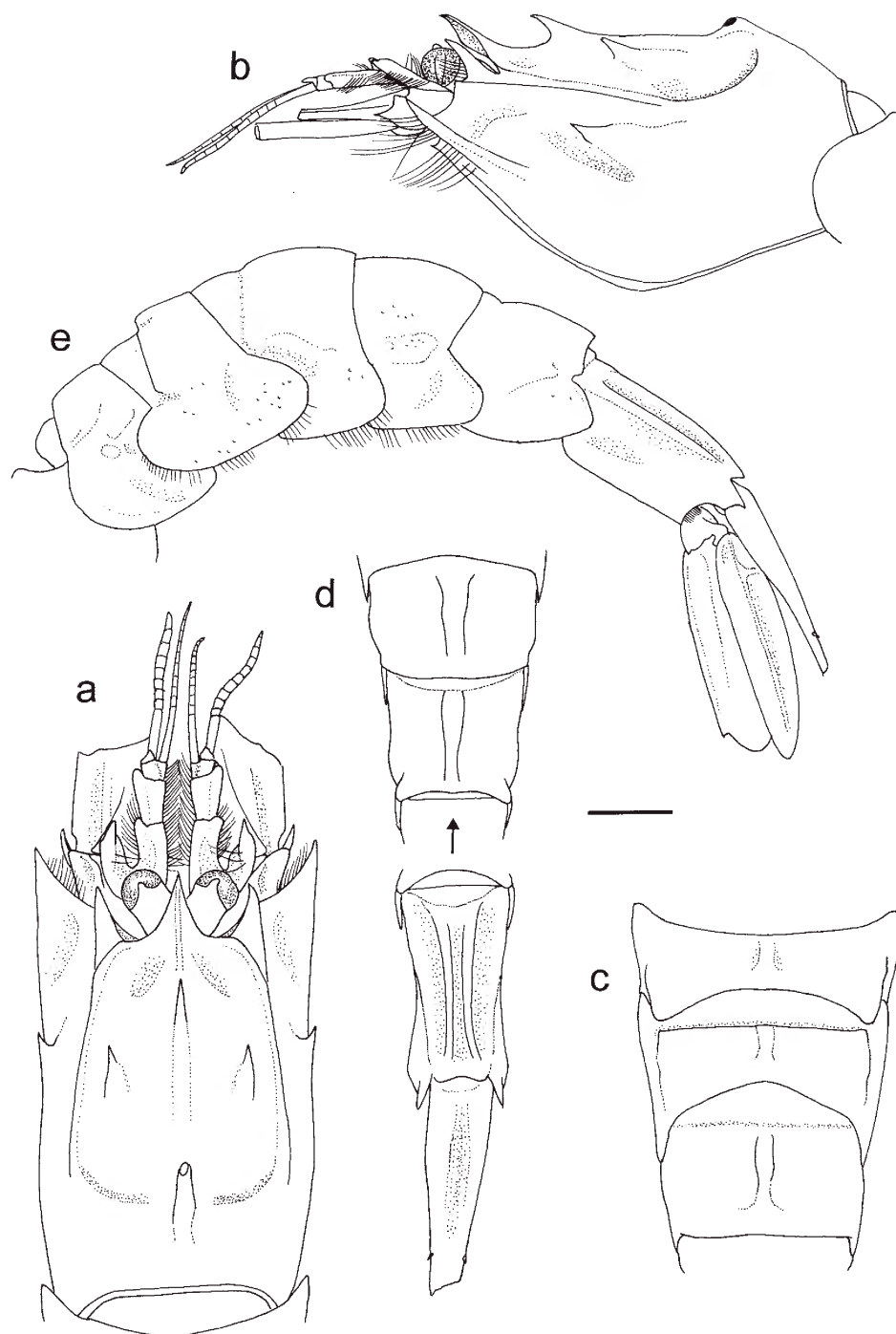


Figure 4. *Metacrangon poorei* sp. nov., holotype, female (cl 8.1 mm), NMV J52069: a, carapace and cephalic appendages, dorsal view; b, same, lateral view; c, first to third abdominal somites, dorsal view; d, fourth abdominal somite to telson, dorsal view; e, entire abdomen, lateral view. Scale bar = 2 mm.

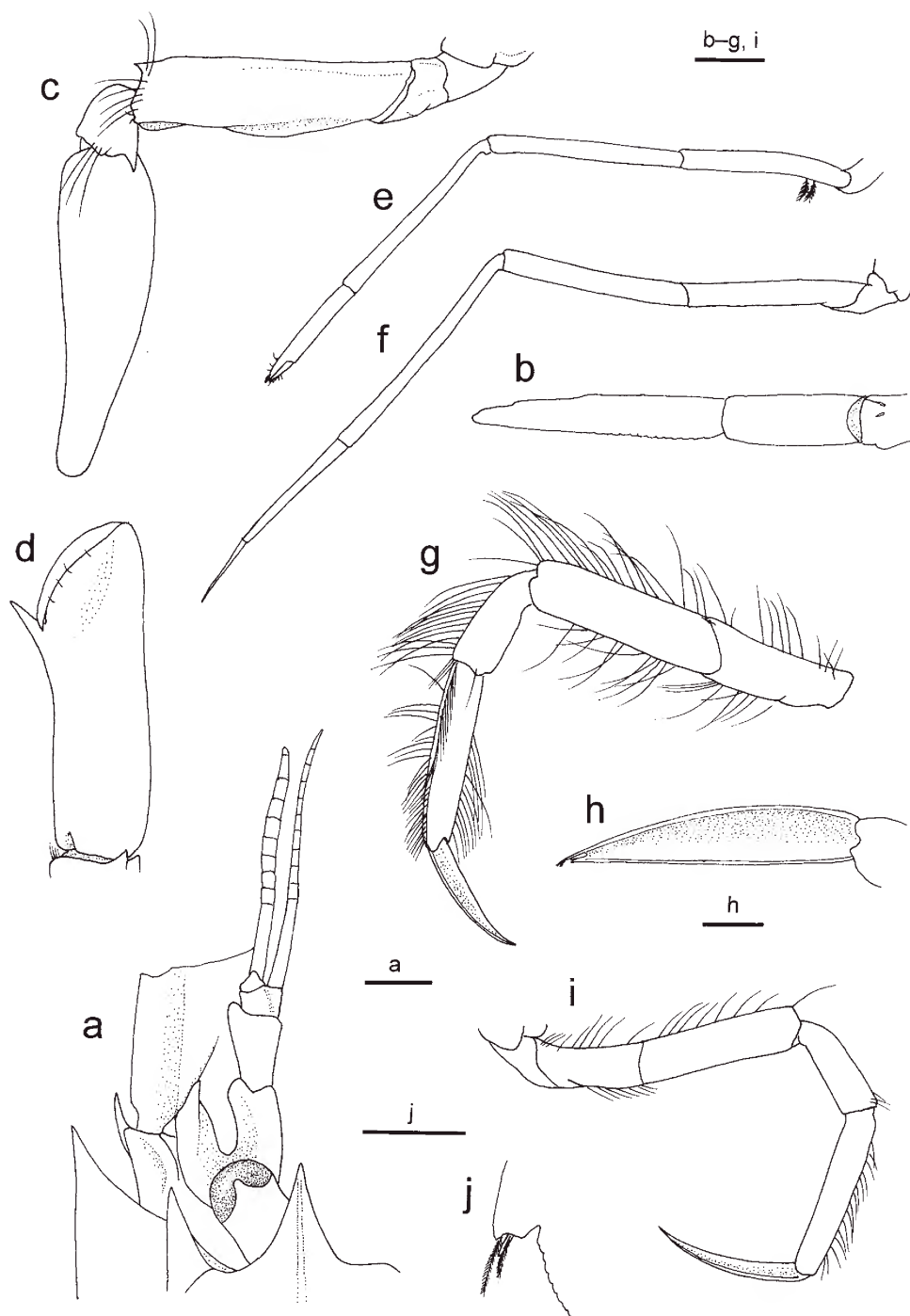


Figure 5. *Metacrangon poorei* sp. nov., holotype, female (cl 8.1 mm), NMV J52069: a, anterior part of carapace (left side) and left cephalic appendages, dorsal view; b, distal two segments and distal part of antepenultimate segment of left third maxilliped, ventral (flexor) view; c, left first pereopod, lateral view; d, same, subchela, flexor view; e, left second pereopod, lateral view; f, left third pereopod, lateral view; g, left fourth pereopod, lateral view; h, same, dactylus, flexor view; i, right fifth pereopod, lateral view; j, posterolateral tooth of left uropodal exopod, dorsal view. Scale bars = 1 mm for a–g and i; 0.5 mm for h and j.

dorsolateral carina distinct, reaching to posterodorsal margin; posterodorsal margin produced, weakly bilobed; pleuron flared laterally, posteroventral tooth small; posterolateral process moderately strong, directed slightly laterally, terminating in sharp tooth. Telson (fig. 4d) damaged, but one pair of dorsolateral spines still preserved.

Eye (figs 4a, 5a) slightly longer than wide; cornea as wide as proximal part of eyestalk, darkly pigmented, corneal width 0.17 of carapace length; eyestalk with small, papilla-like dorsal tubercle.

Antennular peduncle (figs 4a, 5a) moderately stout. First segment with prominent, blunt distolateral process directed dorsally; distomesial margin unarmed; stylocerite just reaching tip of distolateral process, subacutely pointed, lateral margin gently convex. Second segment slightly widened distally, distinctly longer than wide, with prominent, blunt distolateral process. Third segment wider than long. Outer flagellum consisting of 10–11 articles.

Antennal basicerite (fig. 5a) stout, with rounded dorsodistal lateral angle and long ventrolateral tooth distinctly overreaching dorsodistal lateral angle. Antennal scale damaged (fig. 5a).

Third maxilliped (fig. 5b) relatively slender, overreaching antennal scale by 0.6 length of ultimate segment; ultimate segment gradually tapering distally, 6.0 times longer than wide; penultimate segment about 2.7 times longer than wide; antepenultimate segment with two unequal spiniform setae subdistally.

First pereopod (figs 5c–d) moderately stout; palm 3.5 times longer than wide, not widened proximally or distally; lateral and mesial margins faintly sinuous; thumb moderately broad; carpus with small ventrolateral tooth, otherwise unarmed on lateral margin; merus with small dorsodistal tooth, ventral margin sinuous, crested. Second pereopod (fig. 5e) with dactylus about 0.5 times as long as palm; length ratio of chela to ischium 1:1.7:1.6:1.5. Third pereopod (fig. 5f) slender; length ratio of dactylus to ischium 1:1.9:3.4:2.5:2.6. Fourth pereopod (fig. 5g) moderately stout; dactylus (fig. 5h) narrowly spatulate, about 0.6 times as long as propodus, margins naked; dactylus–propodus articulation about 30°; propodus about 5.0 times longer than wide; carpus shorter than propodus, with numerous long setae on dorsal margin; row of long setae on dorsal and ventral margins of merus and ischium (dorsal setae longer than ventral setae). Fifth pereopod (fig. 5i) slightly shorter than fourth pereopod; dactylus slender, subspatulate, longer than dactylus of fourth pereopod, about 0.8 times as long as propodus.

Uropodal exopod with minute posterolateral tooth and minute spinule just located mesial to posterolateral tooth (Fig. 5j).

**Colouration.** Not known.

**Distribution.** Known only from the type locality off southeastern Victoria, at a depth of 1608 m.

**Remarks.** *Metacrangon poorei* sp. nov. is morphologically very similar to *M. variabilis* (Rathbun, 1902) from the northeastern Pacific and *M. proxima* Kim, 2005 from Japan in the disposition of teeth on the carapace and the development of the middorsal carina of the abdomen. Nevertheless, the new species is easily

distinguished from the latter two species by the following characters: the rostrum is acutely pointed and reaches to the distal corneal margins in *M. poorei*, whereas it is blunt or subacute at the tip and falls far short of the distal corneal margins in the latter two species; the anterolateral angle of the postorbital carina is rounded in *M. poorei*, rather than bearing a small triangular tooth or denticle in the latter two species; the lateral carina on the fifth abdominal somite is obsolete in *M. poorei* sp. nov, but it is distinct in the latter two species; and the stylocerite of the antennule reaches the distolateral process on the first peduncular segment in the new species, rather than falling far short of it in the latter two species.

**Etymology.** It is our pleasure to dedicate this new species to our esteemed colleague, Dr. Gary C. B. Poore.

### *Metacrangon spinidorsalis* sp. nov.

*Metacrangon* sp. (Poore, 2004, 139, fig. 36f)

*Metacrangon* sp. MoV 5423. (Poore *et al.*, 2008, 81)

Figures 6–10

**Material examined.** Holotype: Australia, Western Australia, off Point Hillier (35°22.54'S, 117°12.25'E – 35°22.54'S, 117°12.25'E), 539 m, 22 Nov 2005, FRV *Southern Surveyor*, beam trawl (stn SS10/2005/019), WAM C45115 (1 female, cl 10.4 mm).

Paratypes: Tasmania, Tasman Sea off Maria Island (42°42.8'S, 148°22.2'E), 450 m, 25 Jun 1984, RV *Soela*, demersal beam trawl (stn S03/84/77), NMV J40886 (1 female, cl 7.6 mm); Southern Ocean, 48 km west of Richardson Point (41°15.0'S, 144°08.0'E), 520 m, 20 Oct 1984, Frank and Bryce demersal trawl (stn S05/84/51), NMV J40954 (1 female, cl 9.0 mm). Western Australia, off Point Hillier (35°22.54'S, 117°12.25'E – 35°22.54'S, 117°12.25'E), 539 m, 22 Nov 2005, FRV *Southern Surveyor*, beam trawl (stn SS10/2005/019), NMV J54497 (3 females, cl 5.4–10.4 mm, 6 males, cl 6.1–7.0 mm); off Bald Island (35°04.01'S, 118°39.50'E – 35°13.40'S, 118°40.30'E), 728–710 m, 23 Nov 2005 (stn SS10/2005/032), NMV J19215 (1 female, cl 7.7 mm); (35°12.49'S, 118°39.04'E – 35°12.14'S, 118°40.08'E), 431–408 m, 24 Nov 2005 (stn SS10/2005/034), WAM C45116 (1 female, cl 6.9 mm); off Perth Canyon (31°59.33'N, 115°10.59'E – 32°00.07'S, 115°10.41'E), 508–478 m, 29 Nov 2005 (stn SS10/2005/068), NMV J54512 (4 females cl 6.7–9.5 mm, 1 male cl 6.5 mm).

**Description.** Female. Body (fig. 6) moderately robust. Rostrum (figs 7a–b) narrowly triangular with acute apex in dorsal view, directed forward, 0.20–0.25 times as long as carapace; dorsal surface nearly flat; lateral margin slightly arched in lateral view, merging into postorbital region of carapace; midventral carina low, ventral margin slightly sinuous in lateral view. Carapace (figs 6, 7a) slightly widened posteriorly, slightly longer than wide postorbitally; surface covered with very short setae; dorsal midline with two moderately small teeth; anterior tooth arising at rostral base, not overlapping rostrum, slightly larger than posterior (cardiac) tooth; posterior (cardiac) tooth arising at 0.55–0.60 of carapace length; submedian teeth moderately small; hepatic tooth relatively small; antennal tooth moderately strong, directed forward in dorsal view, somewhat ascending in lateral view (angle about 30° against horizontal plane of carapace), acuminate, far falling short of rostral apex; orbital cleft present, but only weakly delimited; anterolateral margin between antennal and branchiostegal tooth concave,



with tiny spinule inferior to base of antennal tooth; branchiostegal tooth moderately strong, directed forward in dorsal view and somewhat dorsally in lateral view, reaching dorsodistal margin of antennal basicerite; pterygostomial tooth small, not visible in lateral view; postorbital carina clearly delimited, accompanied by longitudinal suture; epibranchial carina weakly delimited.

In spawning molts, thoracic sternum concave, armature absent; only fifth sternite with small tubercles medially. In nonspawning molts, fifth sternite with sharp, procurved tooth; sixth to seventh somites each with rounded, strongly compressed prominence, becoming higher posteriorly.

Abdomen (figs 6, 7c) slightly sculptured; anterior two somites without trace of middorsal carina anteriorly, but second tergum with distinct spiniform middorsal tooth located at anterior end of posterior section; third somite with trace of middorsal carina, and fourth somite with broad, clearly delimited middorsal carina. First and second pleura each with blunt tooth on ventral margin; third pleuron with blunt tooth at anteroventral angle; fourth pleuron unarmed. Fifth somite with low, but distinct middorsal carina; posterodorsal margin faintly produced medially; posterolateral margin unarmed; pleuron with posteroventral angle subacutely pointed, ventral margin gently convex. Sixth somite with distinct, straight submedian carinae, not reaching posterodorsal margin; dorsolateral carina distinct, reaching to posterodorsal margin; posterodorsal margin produced, faintly bilobed; pleuron flared laterally, posteroventral tooth small, acute or subacute; posterolateral process strong, directed slightly laterally, terminating in sharp tooth. Telson (fig. 7c) longer than sixth somite, tapering to acute tip; dorsal surface deeply grooved mesially, with three pairs of lateral spines, anterior-most pair located at about midlength; two plumose setae posterior to third pair of lateral spines (fig. 7d).

In spawning molt, first to fourth abdominal sternites unarmed; fifth sternite with low median tubercle. Sixth abdominal sternite shallow depressed medially.

Eye (figs 7a–b) slightly longer than wide; cornea slightly wider than eyestalk, light brown or opaque in preservative, corneal width 0.14–0.15 of carapace length; eyestalk with small, papilla-like dorsal tubercle.

Antennular peduncle (figs 7a–b) moderately stout, overreaching midlength of antennal scale. First segment with prominent, blunt distolateral process directed dorsally; distomesial margin unarmed; stylocerite falling slightly short of distolateral process, acutely or subacutely pointed, lateral margin gently convex. Second segment slightly widened distally, distinctly longer than wide, with prominent, blunt distolateral process. Third segment wider than long. Outer flagellum overreaching distal margin of lamella of antennal scale by about 0.4 length, consisting of 10–11 articles.

Antennal basicerite (fig. 7e) stout, with sharply pointed dorsodistal lateral angle and short ventrolateral tooth slightly overreaching dorsodistal lateral angle; carpocerite subcylindrical, reaching distal 0.20 of antennal scale. Antennal scale (figs 7a, 7e) about 0.50 times as long as carapace and 2.3 times longer than wide; lateral margin faintly sinuous; distolateral tooth relatively wide, slightly falling short of rounded distal margin of lamella.

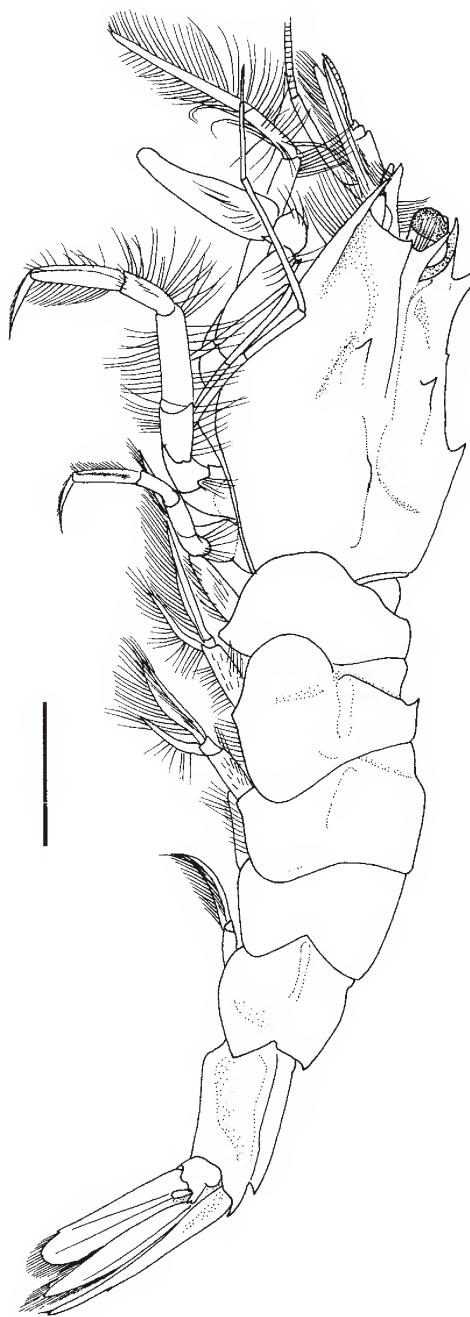


Figure 6. *Metacrangon spinidorsalis* sp. nov., holotype, female (cl 10.4 mm), WAM C45115, entire animal in lateral view. Scale bar = 5 mm.

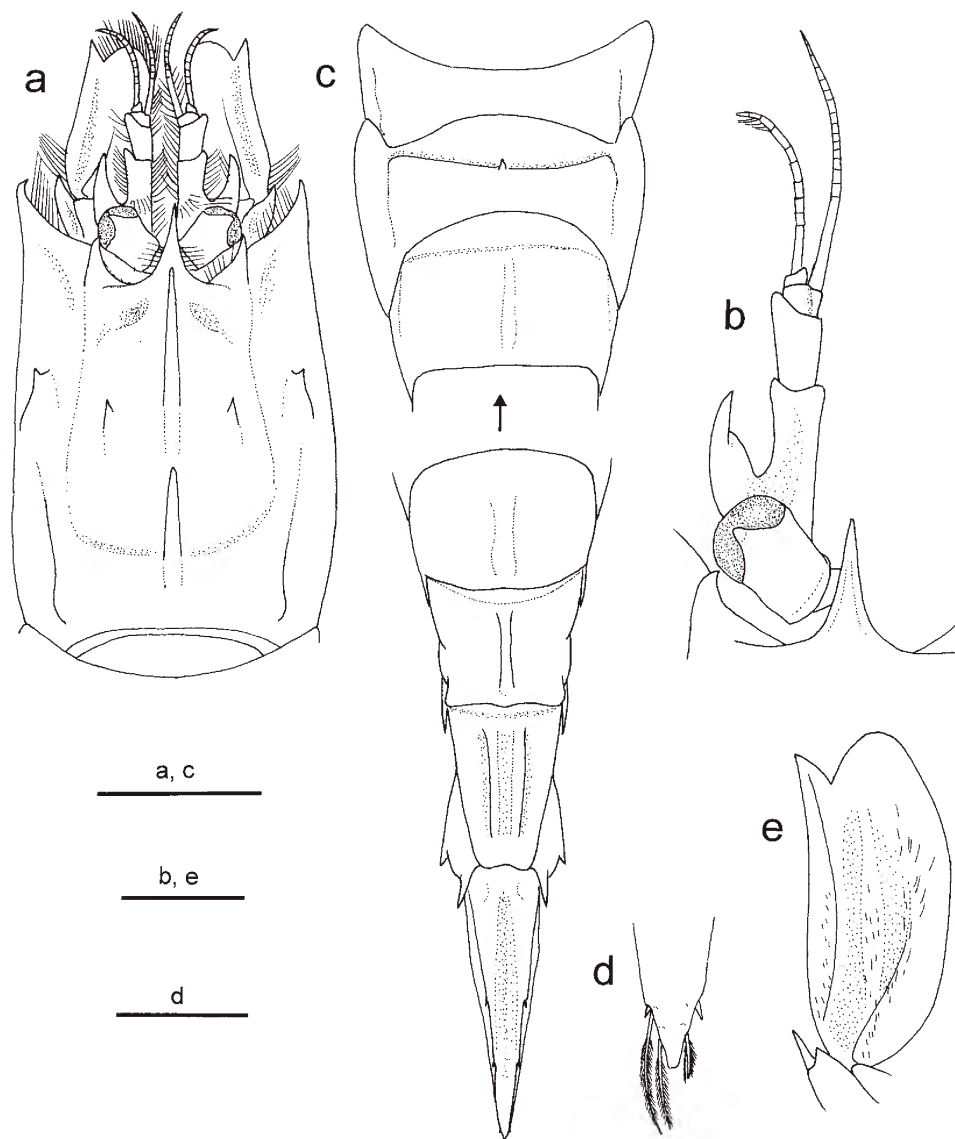


Figure 7. *Metacrangon spinidorsalis* sp. nov., holotype, female (cl 10.4 mm), WAM C45115: a, carapace and cephalic appendages, dorsal view; b, anterior part of carapace (left side), left eye and left antennule, dorsal view (setae omitted); c, abdomen, dorsal view; d, distal part of telson, dorsal view; e, left antennal scale, dorsal view. Scale bars = 5 mm for a and c; 2 mm for b and e; 1 mm for d.

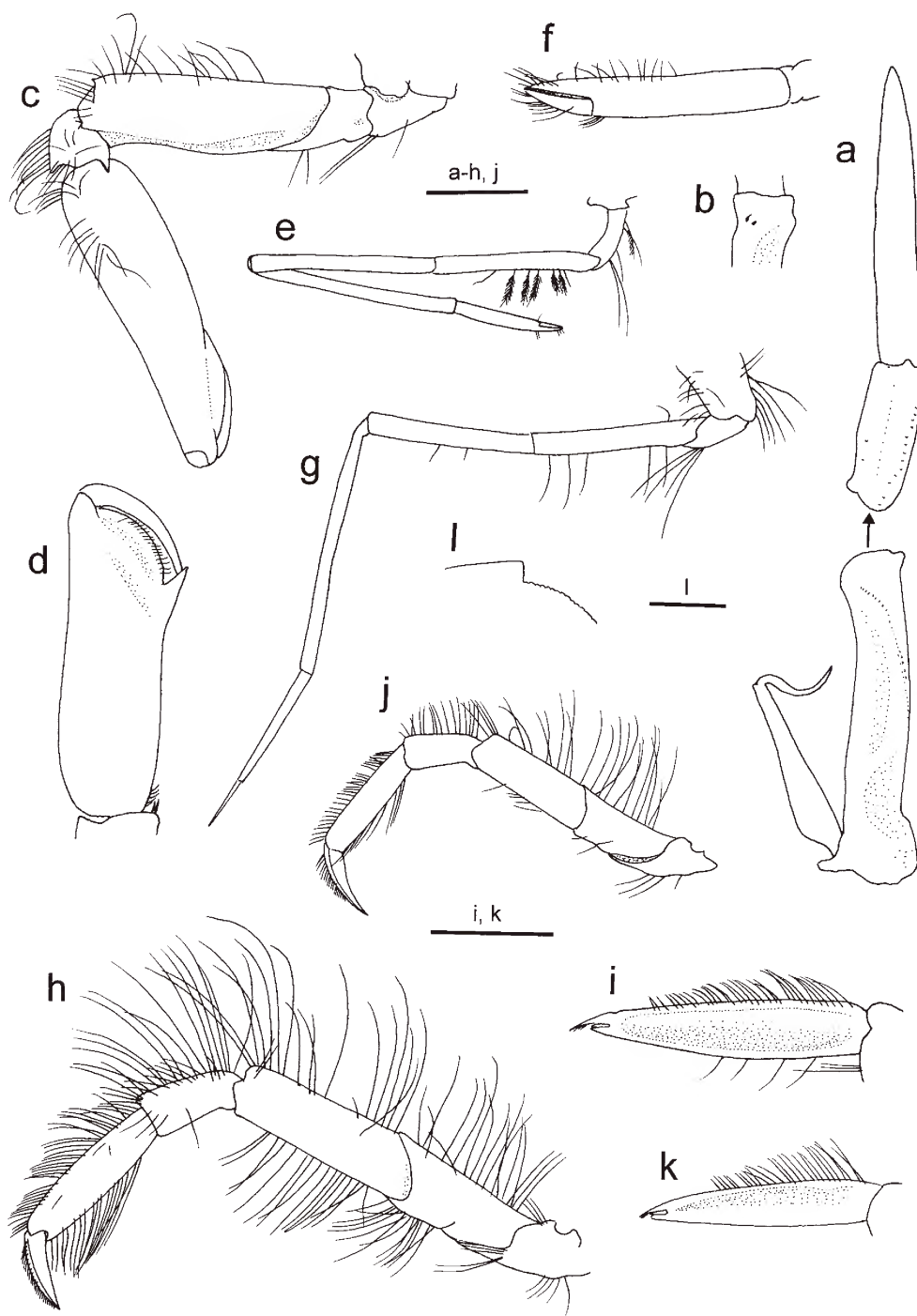


Figure 8. *Metacrangon spinidorsalis* sp. nov., holotype, female (cl 10.4 mm), WAM C45115; left thoracic appendages: a, third maxilliped, dorsal view (setae omitted); b, distal part of antepenultimate segment of third maxilliped, ventral view; c, first pereopod, lateral view; d, same, subchela, dorsal (extensor) view; e, second pereopod, lateral view (coxa damaged); f, same, chela, extensor view; g, third pereopod, lateral view; h, fourth pereopod, lateral view; i, same, dactylus, flexor view; j, fifth pereopod, lateral view; k, same, dactylus, flexor view; l, posterolateral tooth of right uropodal exopod, dorsal view (setae omitted). Scale bars = 2 mm for a–h and j; 1 mm for i and k; 0.5 mm for l.

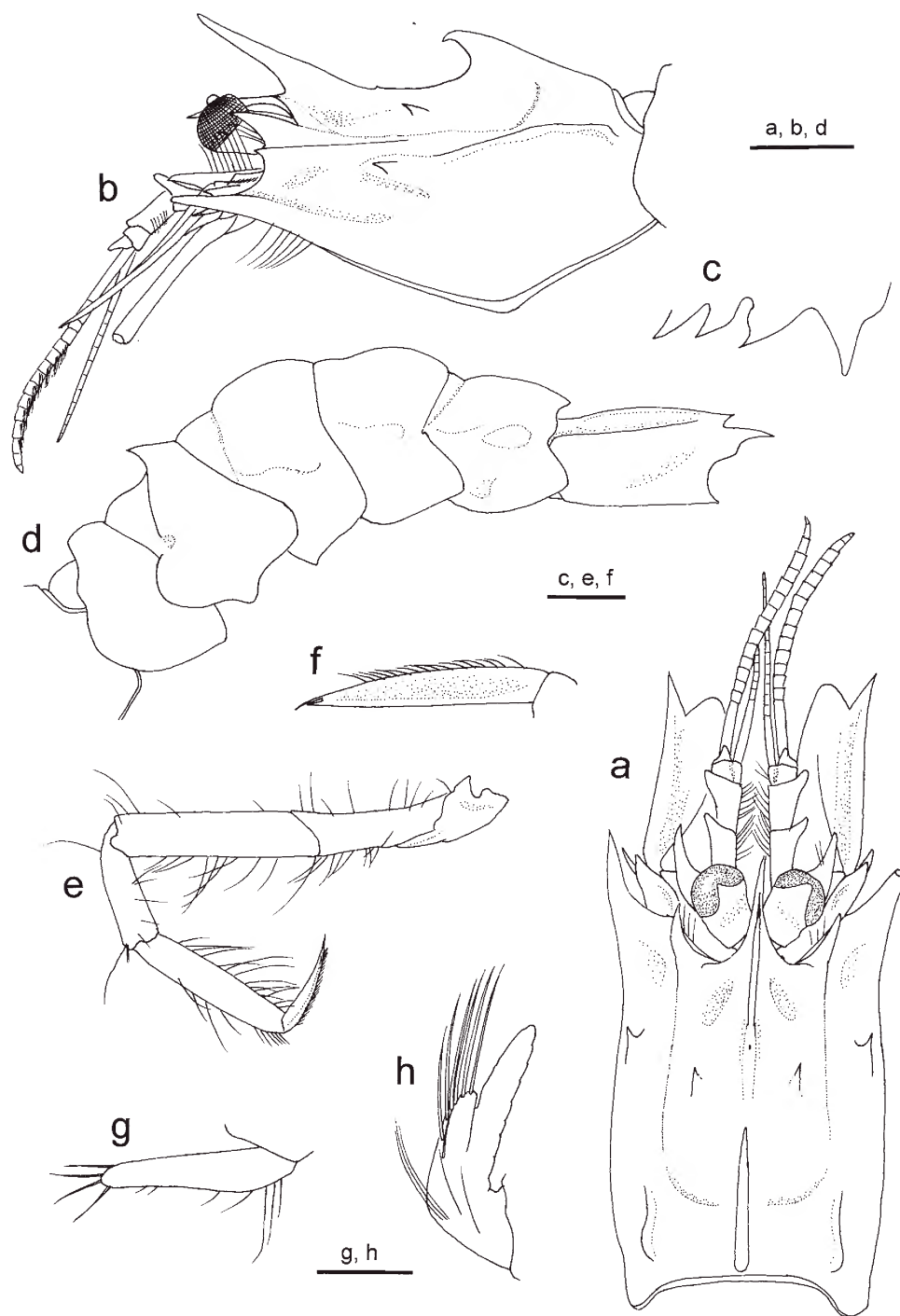


Figure 9. *Metacrangon spinidorsalis* sp. nov., paratype, male (cl 6.5 mm), NMV J54512: a, carapace and cephalic appendages, dorsal view; b, same, lateral view; c, thoracic teeth, ventrolateral view; d, abdomen, lateral view; e, left fourth pereopod, lateral view; f, same, dactylus, flexor view; g, endopod of left first pleopod, ventral view; h, endopod and appendix masculina of left second pleopod, mesial view. Scale bars = 2 mm for a, b and d; 1 mm for c and e; 0.5 mm for f–h.



Figure 10. *Metacrangon spinidorsalis* sp. nov., paratype, male (cl 6.2 mm), NMV J54497, lateral view taken of live specimen on board FRV *Southern Surveyor*. Scale bar = 10 mm.

Third maxilliped (fig. 8a) relatively slender, overreaching antennal scale by 0.6 length of ultimate segment; margins and dorsal surface of distal two segments with numerous short to long setae. Ultimate segment gradually tapering distally, 6.5–7.0 times longer than wide. Penultimate segment about 2.6 times longer than wide. Antepenultimate segment sinuously curved in dorsal view, with thick tuft of long setae dorsodistally; ventral surface with two minute spiniform setae subdistally (fig. 8b). Coxa with rounded lateral process (not figured). Exopod falling far short of distal margin of antepenultimate segment, with well-developed flagellum.

First pereopod (figs 8c–d) moderately stout, reaching distal margin of antennal scale; palm 3.0–3.5 times longer than wide, not widened proximally or distally, cutting edge oblique; lateral and mesial margins nearly straight; thumb moderately broad; carpus with small ventrolateral tooth, otherwise unarmed on lateral margin; merus with small dorsodistal tooth, ventral margin sinuous, crested. Second pereopod (fig. 8e) reaching nearly to midlength of antennal scale; dactylus about 0.5 times as long as palm; cutting edges of fingers with row of minute spiniform setae (fig. 8f); length ratio of chela to ischium 1:1.9:1.6:1.5; coxa with prominent flap-like process (not figured). Third pereopod (fig. 8g) slender, nearly reaching distal margin of antennal scale by tip of dactylus; length ratio of dactylus to ischium 1:2.2:4.6:2.9:3.2. Fourth pereopod (fig. 8h) moderately stout, slightly overreaching midlength of antennal scale by dactylus; dactylus (fig. 8i)

spatulate, about 0.8 times as long as propodus, upper margin with row of dense stiff setae, lower margin with few sparse setae; tip of dactylus terminating in two unequal projections flanking unguis, upper projection longer, with minute setae; dactylus–propodus articulation about 45°; propodus about 3.6 times longer than wide, bearing row of dense stiff setae on dorsal and ventral margins; carpus shorter than propodus, with numerous long setae on dorsal margin; row of long setae on dorsal and ventral margins of merus and ischium (dorsal setae longer than ventral setae). Fifth pereopod (fig. 8j) distinctly shorter than fourth pereopod, falling far short of base of branchiostegal tooth; dactylus (fig. 8k) subspatulate, shorter than dactylus of fourth pereopod, about 0.6 times as long as propodus; setation much less than in fourth pereopod.

Uropod (fig. 6) not reaching tip of telson; exopod with nearly straight lateral margin, posterolateral angle terminating in truncate tooth (fig. 8l); no movable spinule mesial to posterolateral tooth; endopod longer and narrower than exopod.

Male. Rostrum nearly spiniform (fig. 9A), 0.25–0.35 times as long as carapace, slightly overreaching distal corneal margins. Carapace (figs 9a–b) with two prominent middorsal teeth, anterior tooth elongate, arising slightly anterior to or just at level of posterior margin of orbit, overlapping rostrum; posterior tooth strong, hooked; branchiostegal tooth strong, curved slightly laterally, distinctly overreaching distolateral angle of antennal basicerite. Fifth to eighth thoracic sternites (fig. 9c) with



prominent, acute teeth becoming larger posteriorly.

Middorsal tooth on second abdominal somite larger than in female; pleural ventral teeth on anterior three somites more pronounced in females (fig. 9d).

Corneal width 0.18–0.20 of carapace length (fig. 9a). Outer antennular flagellum (fig. 9a–b) overreaching antennal scale by 0.8 length, consisting of 15–18 articles. Antennal scale (fig. 9a) 0.55–0.60 times as long as carapace; distolateral tooth distinctly overreaching distal lamella.

Fourth pereopod (fig. 9e) more slender than in females (propodi about 4.5 times longer than wide); dactylus (fig. 9f) narrowly spatulate.

Endopod of first pleopod (fig. 9g) tapering distally to rounded tip, bearing four stiff setae terminally. Second pleopod with appendix masculina reaching about distal 0.6 of endopod, bearing about 10 long spiniform setae (fig. 9h).

**Colouration.** Carapace, abdominal somites, pereopods, telson and uropods relatively uniform brownish red colour. Body, legs and first pereopods covered with whitish pigment spots; similar spots also present, but less pronounced on generally paler second to fifth pereopods.

**Distribution.** The present material contains specimens from two rather distant localities, namely southwestern Australia and Tasmania, suggesting that this species is widely distributed in southern Australia, at depths of 408–728 m.

**Remarks.** As is apparent from the above description, *Metacrangon spinidorsalis* sp. nov. shows considerable degree of sexual dimorphism in the development of the middorsal teeth on the carapace and the shape of the antennal scale.

This new species is referable to the *Metacrangon jacqueti* species group because of the disposition of teeth on the carapace, the presence of ventral tooth on each first to third abdominal pleuron, and the setose margins of the dactyli of the fourth and fifth pereopods (Komai, 1997). The following nine species are referred to this informal species group (Komai, 1997; Retamal and Gorny, 2003): *M. agassizi* (Smith, 1882) from the northwestern Atlantic; *M. bahamondei* Retamal and Gorny, 2003 from southern part of Chile; *M. bellmarleyi* (Stebbing, 1914) from western to southern Africa; *M. crosnieri* Komai, 1997 from Madagascar; *M. jacqueti* from the northeastern Atlantic; *M. knoxi* from the Chatham Rise, New Zealand; *M. ochotensis* (Kobjakova, 1955) from the South Kuril Islands in the northwestern Pacific; *M. procax* (Faxon, 1893) from California to Peru in the eastern Pacific; and *M. similis* Komai, 1997 from Japan. However, *M. spinidorsalis* is unique even within the genus, as it possesses a distinct middorsal tooth on the second abdominal tergite. Furthermore, in this new species, the orbital cleft is only weakly delimited. In this regard, this new species is intermediate between *M. knoxi* (where the orbital cleft is absent) and other species in the *M. jacqueti* species group (where the orbital cleft is distinct). The small anterior middorsal tooth on the carapace in females, which does not overlap the rostrum, also distinguishes *M. spinidorsalis* from other species in the *M. jacqueti* species group.

**Etymology.** Named in reference to the characteristic spiniform tooth on the second abdominal tergite.

## Concluding remarks

This study reports the significant findings of three new species of *Metacrangon* from rather high latitudinal areas in the southern oceans of Australia, increasing the number of species known from the southern hemisphere from five to eight. The previously described species known from the southern hemisphere are *M. bahamondei*, *M. bellmarleyi*, *M. crosnieri*, *M. knoxi* and *M. richardsoni* (Yaldwyn, 1960) (cf. Yaldwyn, 1960; Komai, 1997; Retamal & Gorny, 2003). With the exception of *M. richardsoni*, all of them are referred to the *M. jacqueti* species group. Although *Metacrangon* has been well represented by the north Pacific species, it is suggested that the diversity of the genus in the southern hemisphere is much higher than we expected. Other genera of the family have also been shown to be species rich in southern Australian waters with new species and range extensions recently reported for *Lissosabinea* Christoffersen, 1988 and *Philocheras* Stebbing, 1900 (Komai, 2008; Taylor and Collins, 2009; Taylor, 2010).

## Key to Australian species of *Metacrangon*

1. Carapace with anterior middorsal tooth arising at level of rostral base; second abdominal tergite with middorsal tooth; dactylus of fourth pereopod with marginal setae ..... *M. spinidorsalis* sp. nov.
- Carapace with anterior middorsal tooth arising distinctly posterior to rostral base; second abdominal tergite unarmed; dactylus of fourth pereopod naked marginally ..... 2
2. Rostrum overreaching distal corneal margins; orbital cleft absent; middorsal carina on first to fifth abdominal somites crested; antennular stylocerite falling short of distolateral process of first peduncular segment ..... *M. australis* sp. nov.
- Rostrum just reaching distal corneal margins; orbital cleft present; middorsal carina on first to fifth abdominal somites not crested; antennular stylocerite reaching distolateral process of first peduncular segment ..... *M. poorei* sp. nov.

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